

IN THE CLAIMS

1-16 (cancelled)

17.(new) A dynamo-electric machine with separate and harmonized employment of positive and negative interacting forces, said machine comprising:

a primary (2) comprising at least one pair (C_1, C_2) of pole groups ($E_1, E_2; E_3, E_4$), with the pole groups of the at least one pair being mechanically spaced apart and electrically offset from one another by a pole distance (p), wherein each pole group comprises a ferromagnetic core (A_1, A_2, A_3, A_4) and at least an electromagnetic coil ($B_1, B_1', B_2, B_2'; B_3, B_3', B_4, B_4'$);

a secondary (3) comprising a succession of permanent magnets ($3_1, 3_2, \dots, 3_{10}$) that alternate in polarity from one permanent magnet to the next in a given direction; and

a control system (5) connected for controlling the energization of said at least an electromagnetic coil of each said pole group by alternately supplying energizing current during successive energizing time periods (p_1) and halting the supply of energizing current to said at least one electromagnetic coil during successive de-energizing time periods (p_2) that alternate with the energizing time periods,

wherein each said pole distance corresponds to $(n+\frac{1}{2})$ times the dimension of a permanent magnet in the given direction, where $n=0$ or a positive integer, and the energization control performed by said control system causes electromagnetic forces between said primary and said secondary to be balanced by permanent magnet forces for paired dispositions of the pole groups that are active separately during the energizing time

periods and the ferromagnetic cores that are active separately during the de-energizing time periods, thereby neutralizing competing forces, in a succession of operating cycles composed of an electromagnetic energy component cycle superimposed on a ferromagnetic energy component cycle, and wherein said control system causes, during each cycle, said at least one electromagnetic coil to have at least one energizing time period and at least one de-energizing time period.

18.(new) The machine of claim 17 wherein:

each of the component energy cycles is divided into four quarters, each quarter coinciding with a de-energizing time period acting on pairs of permanent magnets of opposite polarity (3₁, 3₃, 3₅, 3₇, 3₉ with 3₂, 3₄, 3₆, 3₈, 3₁₀);

during each ferromagnetic energy component cycle, the ferromagnetic cores of the pair (C₁, C₂) are active in succession during alternating de-energizing time periods (p₂) for two separate cycle quarters each in a complete cycle;

during each electromagnetic energy component cycle, the pole groups of the pair are also active in succession during the alternating energizing time periods (p₁) for two separate cycle quarters each in a complete cycle; and

said control system (5) switches the de-energizing time periods (p₂) and the energizing time periods (p₁) alternatively on one or the other coil that interacts with the permanent magnets.

19.(new) The machine of claim 17, constituting a motor, wherein each electromagnetic coil (B₁, B₁', B₃, B₃'; B₂, B₂', B₄, B₄') is powered with positive and negative electrical current only for two separate cycle quarters during a complete ferromagnetic cycle on two successive permanent magnets during

the energizing time periods (p_1), switched by the control system (5), to transform electromagnetic energy into mechanical energy, and ferromagnetic energy is transformed into mechanical energy cycle by interaction between said ferromagnetic cores and said permanent magnets during the de-energizing time periods (p_2), and the mechanical energy transformed from the electromagnetic energy is added to the mechanical energy transformed from the ferromagnetic energy.

20.(new) The machine of claim 17, constituting a generator of electrical energy, wherein one of said primary and secondary is a rotor having an input shaft to which mechanical energy is supplied to rotate said shaft, wherein the mechanical energy is transformed into electrical current in each electromagnetic coil ($B_1, B_1', B_3, B_3'; B_2, B_2', B_4, B_4'$) for two separate quarters of each electromagnetic energy component cycle, which current is drawn through the control system (5) during the energizing time periods (p_1), while during the de-energizing time periods (p_2), ferromagnetic forces between said magnets and said cores produce mechanical energy that is added to the mechanical energy supplied to said shaft, with total power relating to the sum of each separate cycle.

21.(new) The machine of claim 17 wherein the pole groups ($E_1 \dots$) of the primary (2) are mechanically distanced from each other by a double pole distance ($p_1 + p_2$) equal to an entire permanent magnet and all opposing the center of the alternated permanent magnets ($3_1, 3_2, \dots$) of the secondary (3), while the working step (p) is always of a quarter of a cycle, equal to half a permanent magnet, the energy at play in the two separate cycles is not superimposed but dovetailed and in

cyclical successions, for two separate cycle quarters between the ferromagnetic energy (E_1' , E_1'') and for two other separate cycle quarters (9, 11) with the electromagnetic energy (E_1'' , E_1''') for a complete cycle, alternate by contiguous of four quarters, all controlled by a system that electrically connects the coils at alternating steps (p), a conductor step (p_1) and a neutral step (p_2) in cyclical sequence.

22.(new) The machine of claim 17 wherein one of the primary (2) and the secondary (3) is a stator and the other one of the primary (2) and the secondary (3) is a rotor.

23.(new) The machine according to claim 17, wherein the pole groups (E_1 , E_2 , E_3 and E_4) of the primary (2) are positioned longitudinally to an axis of motion (23) of said machine with the secondary (3) and opposite to permanent magnets (3_1 , 3_2), which also positioned longitudinally and in alternated succession (3_1 and 3_2 , 3_3 and 3_4 , 3_5 and 3_6 , ...).

24.(new) The machine of claim 17 wherein the control system (5) comprises a collector with brushes that electrically connect the coils (B_1 , B_1' , B_3 , B_3' ; B_2 , B_2' , B_4 , B_4') of the pole groups (E_1 , E_3 ; E_2 , E_4) during energizing time periods with a switching frequency corresponding to one quarter of an operating cycle.

25.(new) The machine of claim 17 wherein the control system (5) comprises a decoder of alternating pole distances (p) corresponding to energizing time periods (p_1) and de-energizing time periods (p_2), by optical, magnetic, resistive, inductive or other measuring systems which drive an electronic control

system with transistors, thyristors, or triacs for alternating electrical conduction switching of the coils ($B_1, B_1', B_3, B_3'; B_2, B_2', B_4, B_4'$) relating to the pole groups ($E_1, E_3; E_2, E_4$), the switching occurring at time intervals corresponding to one-quarter of an operating cycle.

26.(new) The machine of claim 17 wherein said pole group cores (A') are disposed opposite to said permanent magnets ($3_1, 3_2$).

27.(new) The machine of claim 17 wherein said pole group cores (A_1'') and said permanent magnets (20) are in an axial relationship to one another.

28.(new) The machine of claim 17 wherein said pole group cores (A_1''') are disposed axially opposite to pairs (21, 22) of said permanent magnets.

29.(new) The machine of claim 17 wherein the disposition of the pole groups (E_1, E_2, E_3 and E_4) of the primary (2), of the permanent magnets ($3_1, 3_2 \dots$) of the secondary (3) and of the control system (5) is rotary, or linear, or linearly annular, and at least one of the pole groups, the permanent magnets and the control system is composed of partial sectors for servo-controls destined to specific uses.

30.(new) The machine of claim 17, comprising two dynamo-electric machines (M_1, M_2) that are coupled together and are mechanically and electrically offset by an amount corresponding to the rotation during one quarter of an operating cycle and mechanically fastened in line in a common axis (23) and which works through the control system (5)

electrically switching first a dynamo-electric machine (M_1) then the other (M_2) for two separate quarters each (12, 13; 14, 15) in a complete cycle of four quarters of electromagnetic energy (12, 14, 13 and 15) during the energizing time periods (p_1) and four superimposed quarters of natural energy (16, 18, 19, 17) relating to the neutral pole distances (p_2).

31.(new) The machine of claim 17, wherein: said control system (5) comprises a collector having conductive connection portions alternating with non-conductive portions; one conductive connection portion and one non-conductive portion together have an extent corresponding to a pole distances (p); each conductive connection portion has an extent corresponding to an energizing time period (p_1); each non-conductive portion has an extent corresponding to a non-energizing time period; and each coil is connected in succession to each conductive connection portion in alternation with each non-conductive portion in cyclical sequence for complete operating cycles of four quarters.

32.(new) The machine of claim 17 wherein the permanent magnets ($3_1, 3_2, 3_3, \dots 3_{10}$) that create the magnetic field are constituted by electromagnets excited electrically in negative feedback.